What is claimed is:

1. A projection objective for microlithography having a lens arrangement comprising:

a first lens group having positive power;

a second lens group having negative power;

a third lens group having positive power;

a fourth lens group having negative power;

a fifth lens group having positive power; and

a sixth lens group having positive power;

wherein a lens at the end of said second lens group, or a lens at the beginning of said third lens group, has an aspheric surface.

2. The projection objective according to claim 1, wherein said lens at the end of said second lens group is the last lens of the second lens group.

3. The projection objective according to claim 1, wherein said lens at the beginning of said third lens group is the first lens of said third lens.

4. The projection objective according to claim 1, wherein said lens arrangement has only one lens having an aspheric surface.

5. A projection objective having a lens arrangement having at least a first waist of a pencil of rays, wherein said lens arrangement comprises at least one of the following:

a lens having an aspheric surface arranged before said first waist,

a lens having an aspheric surface arranged after said first waist, and

lenses having aspheric surfaces arranged before and after said first waist.

6. The projection objective according to claim 5, wherein at least two spherical lenses are arranged between said lenses having aspheric surfaces.

7. The projection objective according to claim 5, wherein said lens arrangement has a first lens group having positive power, a second lens group having negative power, a third lens group having negative power, a fourth lens group having negative power, and a fifth and sixth lens group respectively having positive power, wherein said first lens group has a lens having an aspheric surface.

8. The projection objective according to claim 6, wherein a lens having an aspheric surface is arranged in said second lens group before said waist.

9. The projection objective according to claim 7, wherein said third lens group has a lens having an aspheric surface.

10. The projection objective according to claim 7, wherein said second lens group has an aspheric surface arranged after said waist.

11. The projection objective according to claim 1, wherein said sixth lens group has a first lens having an aspheric surface.

12. The projection objective according to claim 1, wherein a last lens of said third lens group has an aspheric surface.

13. The projection objective according to claim 1, wherein said lens arrangement does not exceed a maximum lens diameter of 280 mm.

14. The projection objective according to claim 13, wherein said lens arrangement does not exceed a maximum lens diameter of 250 mm.

15. The projection objective according to claim 1, having an object side and an image side, wherein said lens arrangement has on said image side a numerical aperture of at least 0.75.

16. The projection objective according to claim 15, wherein said lens arrangement has on said image side a numerical aperture of 0.8.

17. The projection objective according to claim 1, wherein said lens arrangement comprises at least two different materials.

18. The projection objective according to claim 17, wherein said different materials comprise quartz glass and a fluoride or two fluorides.

19. The projection objective according to claim 8, further comprising an aperture stop wherein at least a last two positive lenses before said aperture stop are comprised of CaF_2.

20. The projection objective according to claim 1, wherein said lens arrangement comprises a positive lens comprised of CaF_2, followed by a negative lens of quartz glass, for formation of an achromat.

21. The projection objective according to claim 1, wherein said sixth lens group comprises a lens of CaF_2.

22. A refractive microlithographic projection objective, having a lens arrangement comprising at least one lens with an aspheric lens surface, wherein all aspheric lens surfaces have a vertex radius (R) of at least 300 mm.

23. The refractive microlithographic projection objective according to claim 19, wherein said vertex radius(R) is 350-1,000 mm.

24. The refractive microlithographic objective according to claim 19, wherein said vertex

radius (R) is greater than 1,000 mm.

25. The projection objective for microlithography according to claim 1, wherein the diameter said lens having an aspheric surface is smaller than 90% of the maximum diameter of said lens arrangement.

26. The projection objective according to claim 25, wherein the diameter of said lens having an aspheric surface is smaller than 80% of the maximum diameter of said lens arrangement.

27. A projection exposure device for microlithography, comprising a projection objective according to claim 1.

28. A projection exposure device for microlithography, comprising an excimer laser light source emitting radiation of wavelength shorter than 250 nm, and a projection objective according to claim 19.

29. The projection objective comprising a lens arrangement according to claim 1, wherein said lens arrangement has a high numerical aperture on an objective output side, and all lenses of said lens arrangement have sine values of all angles of incidence of radiation striking a respective lens that are always smaller than the numerical aperture of said lens arrangement.

30. The projection objective according to claim 29, wherein said numerical aperture is in the region of 0.85.

31. The projection objective comprising a lens arrangement according to claim 1, wherein the maximum diameter of lenses of said third lens group is at least 10% smaller than the maximum diameter of lenses of said fifth lens group.

32. The projection objective comprising a lens arrangement according to claim 1, wherein at

least one aspheric lens surface is acted on with an angle loading of at least sin i = 0.75.

33. A process for the production of microstructured components, comprising:

exposing a substrate provided with a photosensitive layer with ultraviolet light by means of a mask and a projection exposure device with a lens arrangement according to claim 1, and,

if necessary after development of said photosensitive layer, structuring said substrate corresponding to a pattern contained on said mask.

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